MULTIPARAMETRIC DATA ANALYSIS FOR SEISMIC SOURCES IDENTIFICATION IN THE CAMPANIA REGION: MERGE OF SEISMOLOGICAL, STRUCTURAL AND GRAVIMETRIC DATA.

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The Campania region is one of the Italian most active areas from a geodynamic point of view since it is characterized by occurrence of intense and widely spread seismic activity. The seismicity of the area is concentrated mainly along the Southern Apennines chain, as well as beneath the Campanian volcanic areas (Vesuvio, Campi Flegrei, Ischia) and is also originated by seismic sources buried in the Campanian Plain and offshore the Thyrrenian sea. The aim of this paper is an attempt to better constrain the main active, outcropping and buried fault systems of the Campanian area through the correlation between seismicity, tectonic structures (from geological data and image analysis) and gravimetric data. The main seismogenetic sources of the Campanian Apennines, responsible for the destructive historical events of 1456, 1688, 1694, 1702, 1732, 1930, 1962 and 1980 (Io = X-XI MCS), activated mainly along NW–SE faults (CPTI, 2004; DISS, 2010) with hypocenters concentrated within the upper 20 km of the crust. The available focal mechanisms of the larger events show normal solutions consistent with NE–SW extension (Pondrelli et al., 2007).

The Plio-Pleistocene Campanian Plain is a structural depression located between the eastern side of the Tyrrhenian Sea and the Southern Apennines chain. The stress field acting in the Campanian Plain is strongly debated. Structural observations on the faults of the Plain suggest prevalent normal motion for the NW–SE and the NE–SW trending faults, and minor oblique motion, consistent with deformation style of the Southern Apennines. The Plain is characterized by seismicity of energy lower than the seismic activity of the Southern Apennines chain mainly occurring along its margins. Minor seismicity spreads out inside the Plain.

In this paper, seismic, geologic and gravimetric data have been analysed in GIS environment. In particular, the seismological data used in this study are relative both to the historical and recent seismic activity, collected by the following Catalogues: CPTI04 Catalogue of Parametric Italian Earthquakes, 2004 (217 b.C to 2002); CSI Catalogue of Instrumental Italian Earthquakes (1981-2002); CNT Seismic Bulletin of Istituto Nazionale di Geofisica e Vulcanologia (2003-2008); Data Base of Seismic Laboratory of Osservatorio Vesuviano (Istituto Nazionale di Geofisica e Vulcanologia) (2000-2009); SisCam Catalogue (Seismotectonic Information System of the Campanian Region) (1980-2000). Seismic data have been merged in a new seismic database. Moreover, new precise locations of a set of seismic events relative to the Campanian Plain have been processed. Some clusters of epicentres have been identified confirming the existence of active buried fault systems inside the Plain. The Geological Dataset has been implemented by merging all outcropping and buried faults extracted from the available geological and geophysical papers and maps (Bigi et al., 1983; Ambrosetti et al. 1986; Bonardi et al.,1988; Orsi et al. 1996; Milia A. e Torrente M.M.,1999; Cinque et al. 2000; Bruno et al. 2003). A multiscale analysis of the gravity and magnetic fields of the Southern Italy has been performed by Fedi et al, 2005. Multiscale Derivative Analysis (MDA) provided an almost complete representation of the structural framework of Southern Italy at three different scales. Most of the known geological elements of the Apennine system are clearly shown at intermediate and short scales, together with several trends indicating the location of buried structures. The main results of the combined analysis of seismic epicentres, faults and gravity data, indicate a strong correlation between seismicity and MDA lineaments from gravity data. Moreover, tectonic structures without correlated seismic activity and spread seismicity, apparently not linked with already known faults (buried faults?) have been identified.

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